Recent Climate Change in the Caribbean

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Caribbean Climate Change Workshop

- January 2001
- At the University of the West Indies
- 18 of the 21 met services in the region participated
- Support from WMO, the University of the West Indies, NOAA and NASA

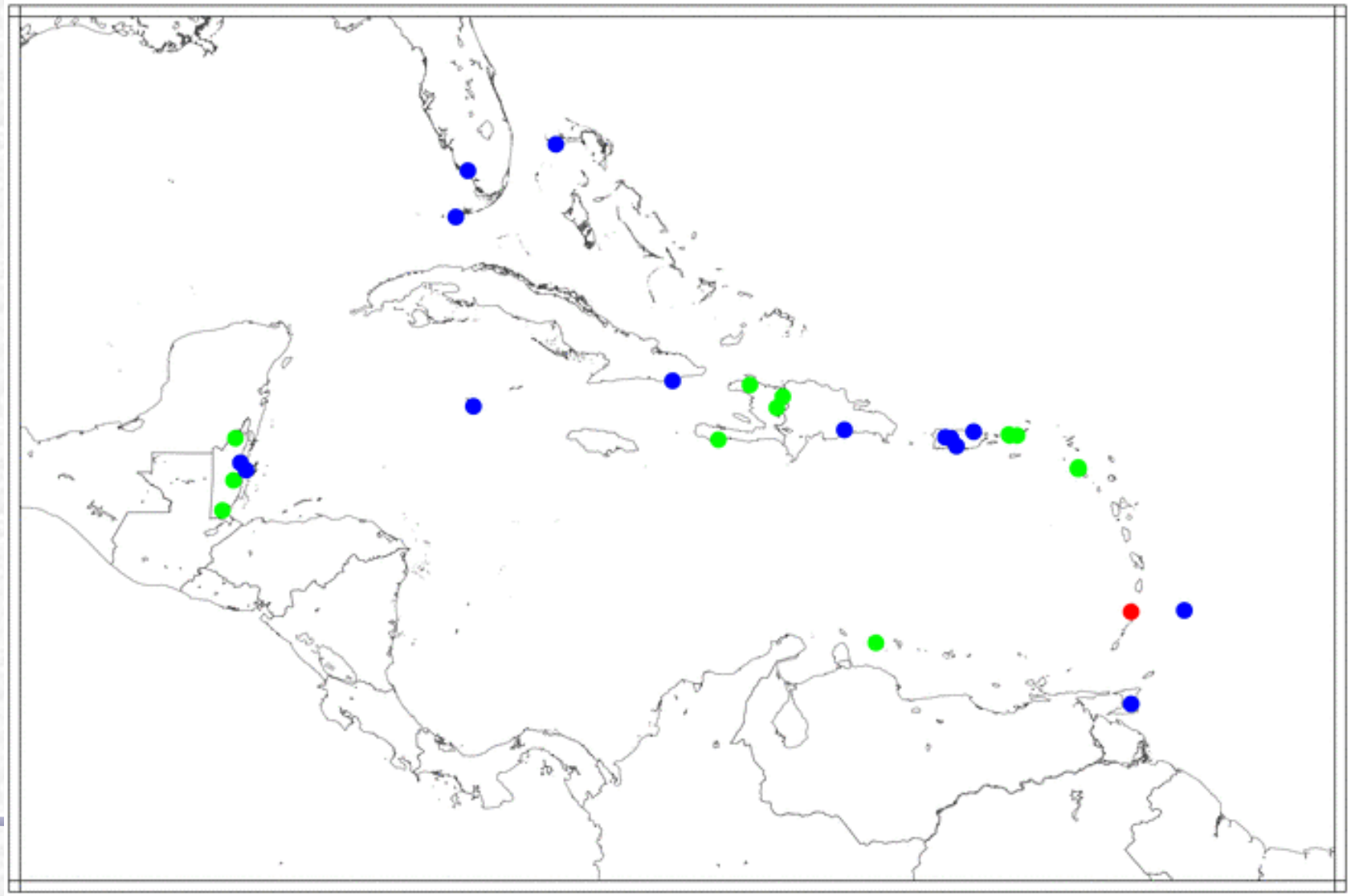
Combination of seminars and hands-on data analysis

Sponsored by the WMO CCl/CLIVAR Working Group on Climate Change Detection

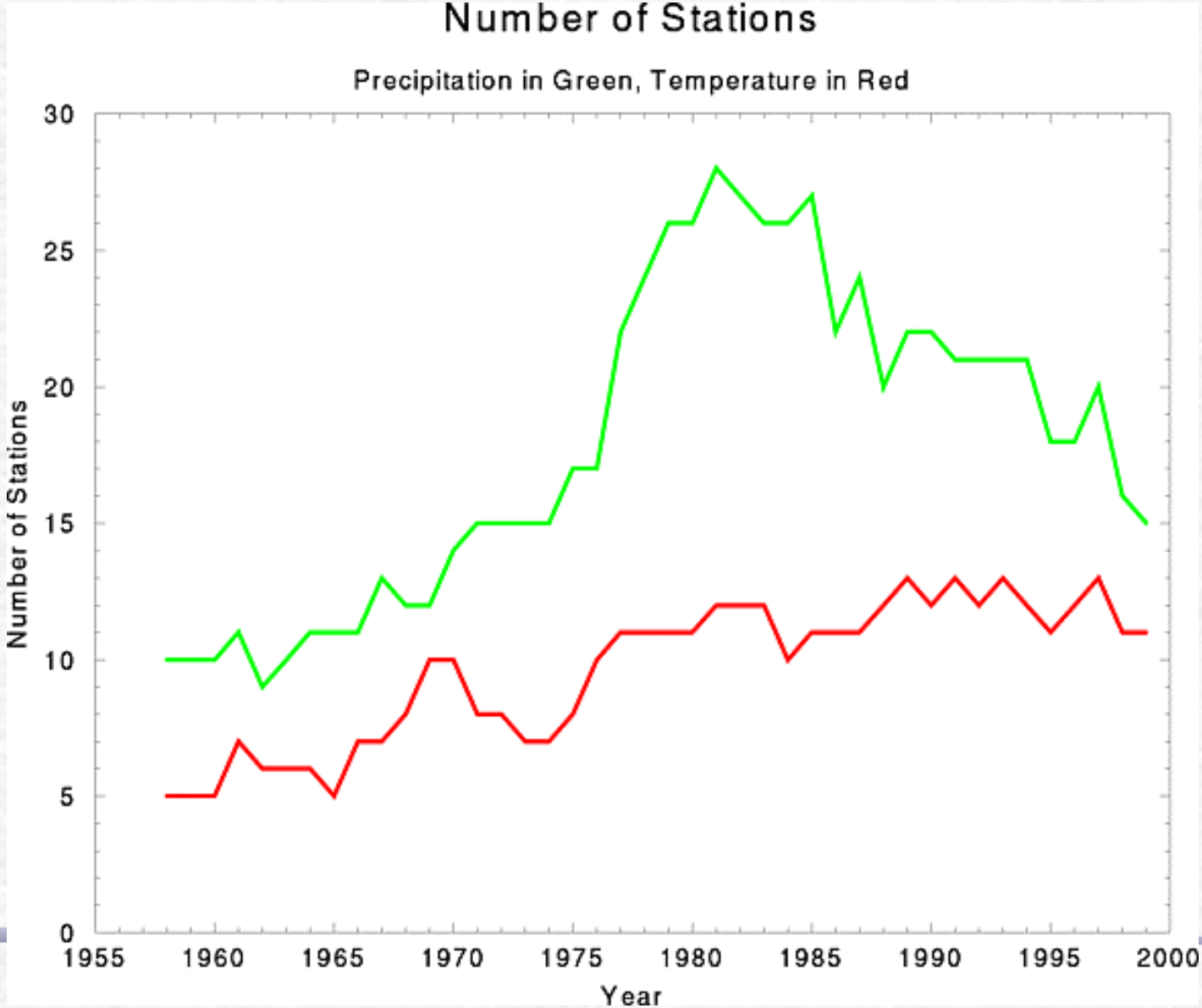
- Analyze indices from daily data
  - Including measures of changes in extremes
- Fill in blank areas on the "global" analysis
- Isolated analyses are questionable
  - Become trustworthy when neighboring stations/countries show similar changes
- Insights gained and shared improve the analyses
  - Neighboring countries often face similar data and climate analysis problems and solutions
- Foster greater appreciation for data and data archeology

30 Stations Used

Precipitation, Temperature, Both

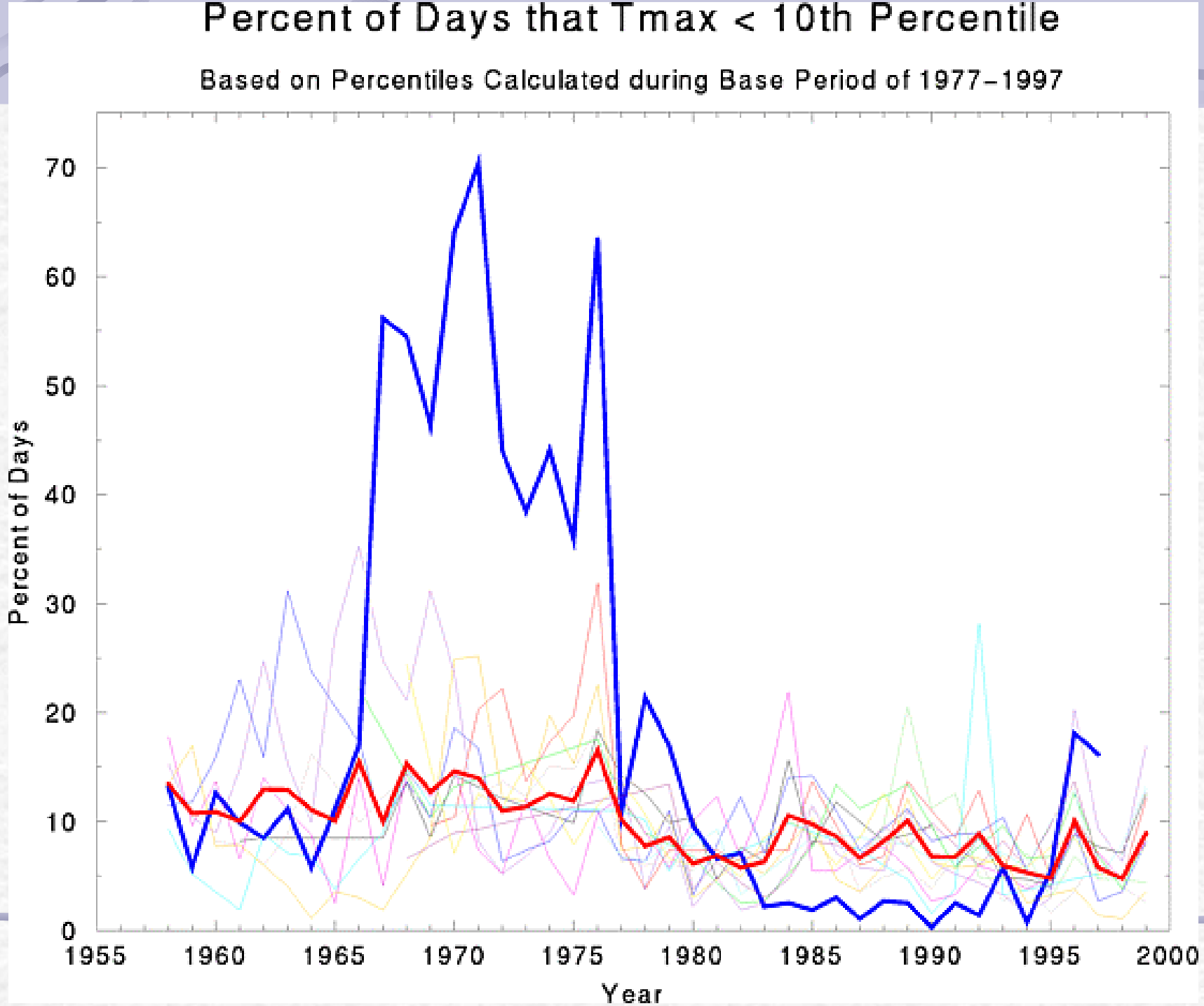


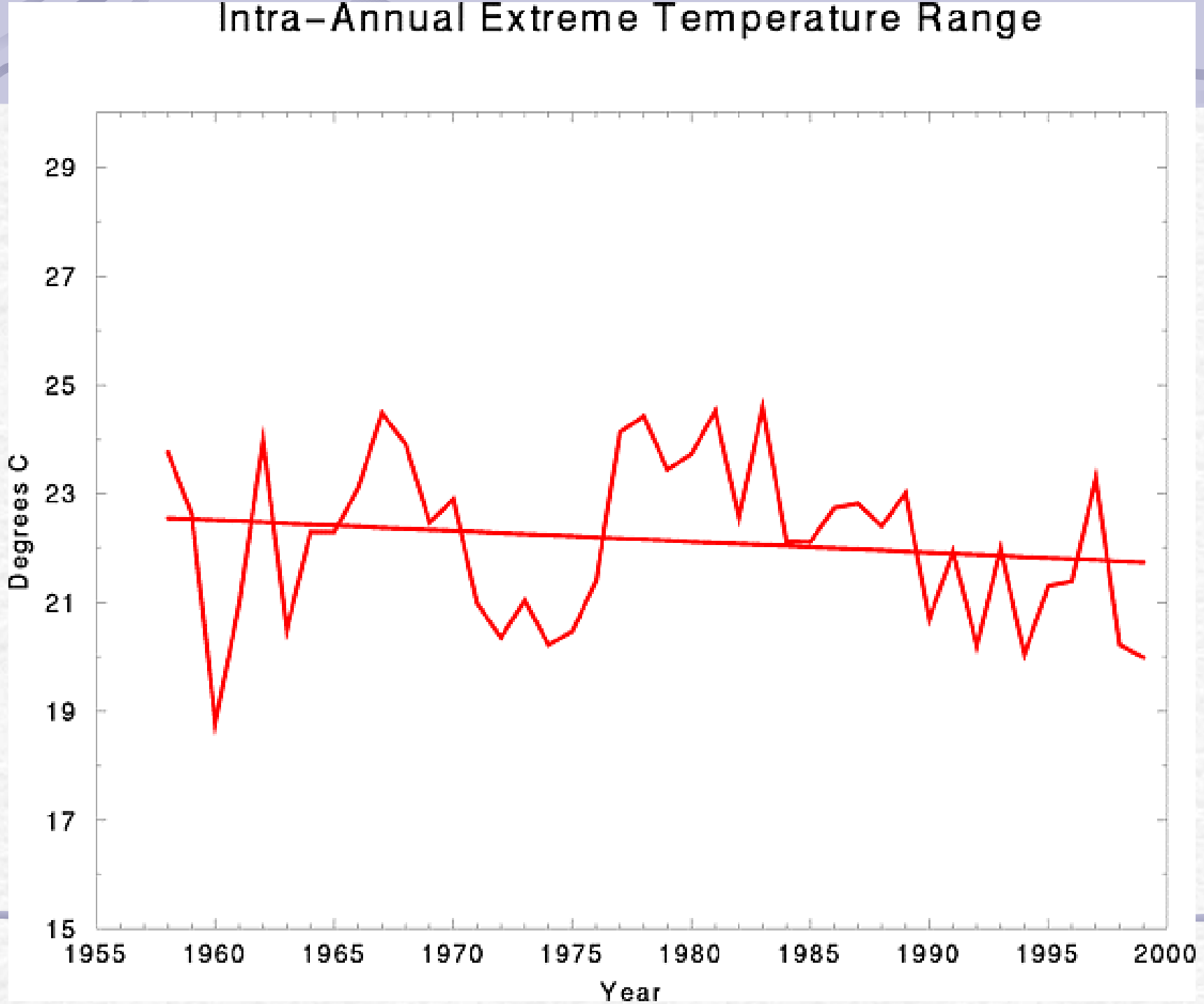
Stations versus Time

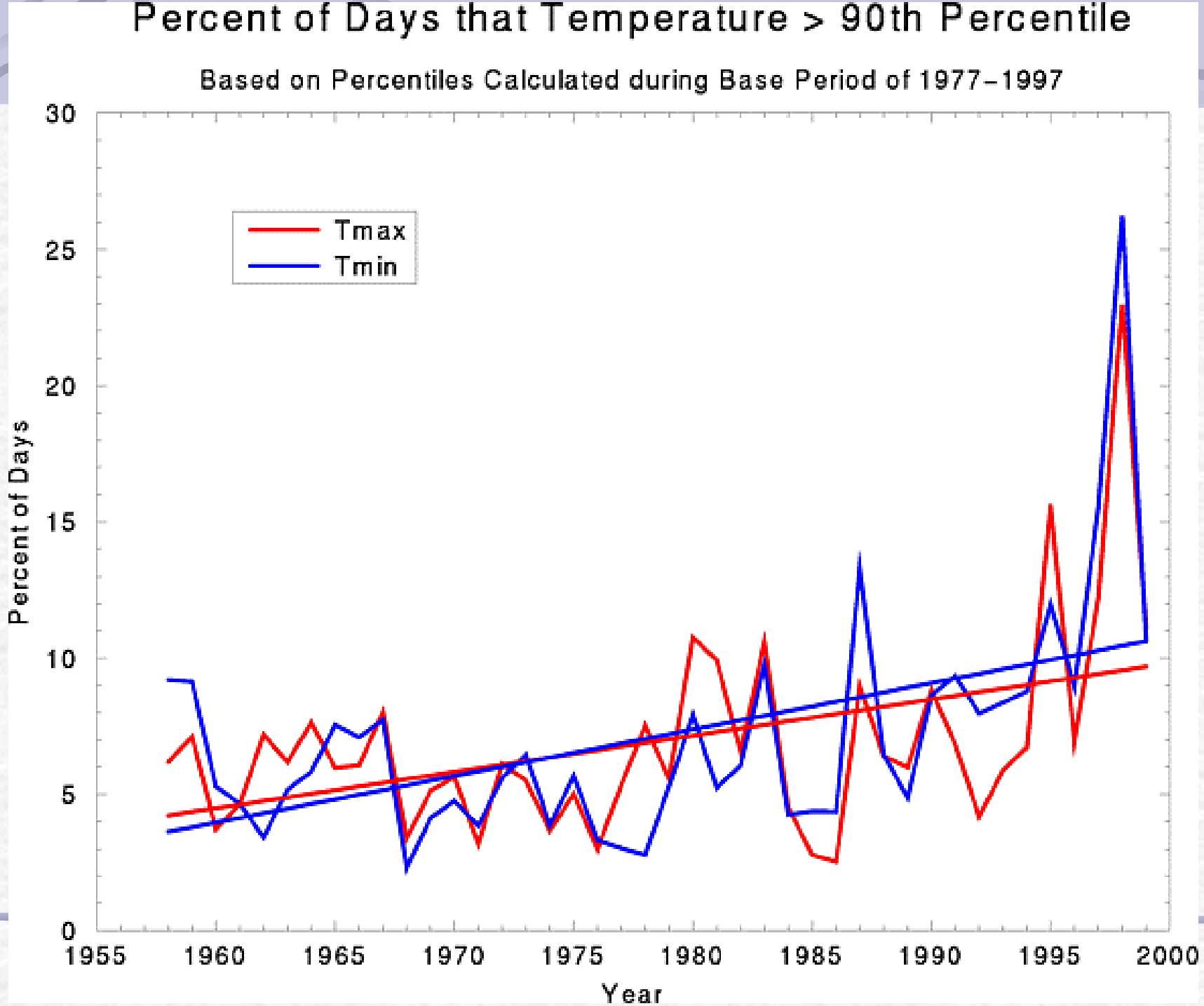


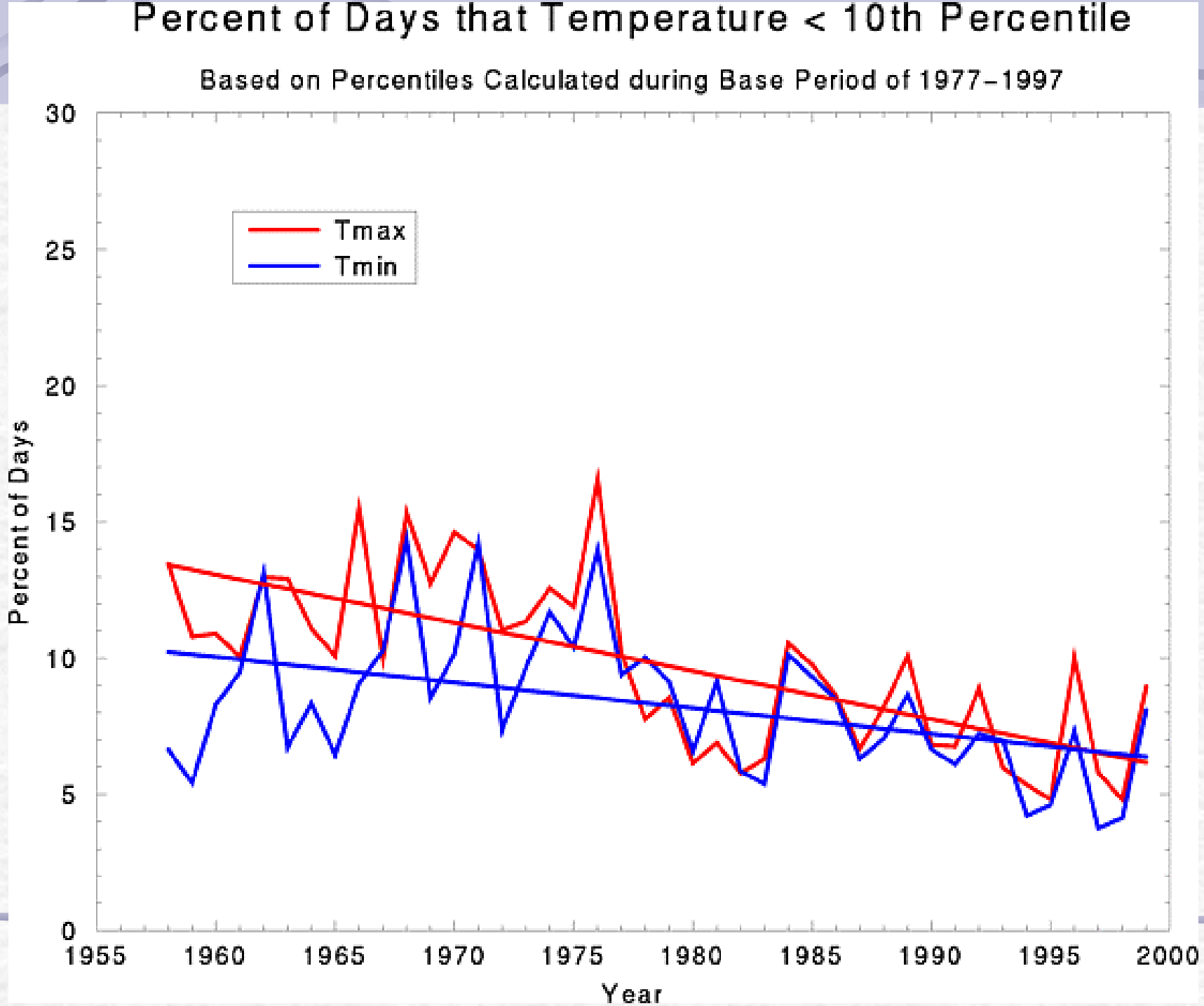
Data Problems

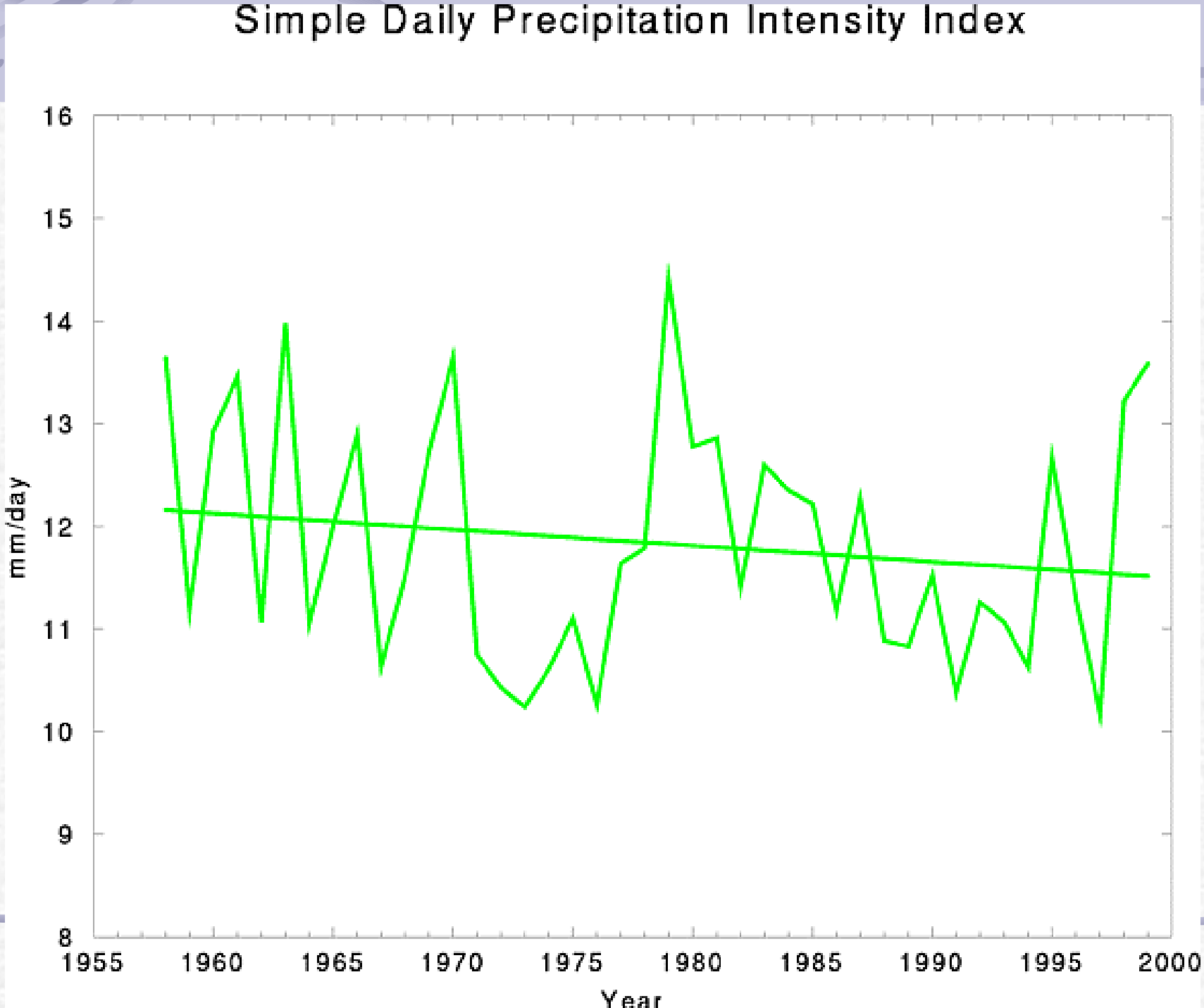
- Many stations' digital record were too short to use in this analysis
  - Limited to data from 30 stations
- QC: a wide variety of checks, including looking for:
  - Extreme values due to digitizing errors
  - Incorrect English/metric units
  - Runs of the same value
  - Tmax < Tmin
  - Missing precipitation set to 0
- Homogeneity
  - Evaluation of time series of the indices to weed out the most inhomogeneous
  - Problem stations: 3 Tmax, 2 Tmin, No precipitation

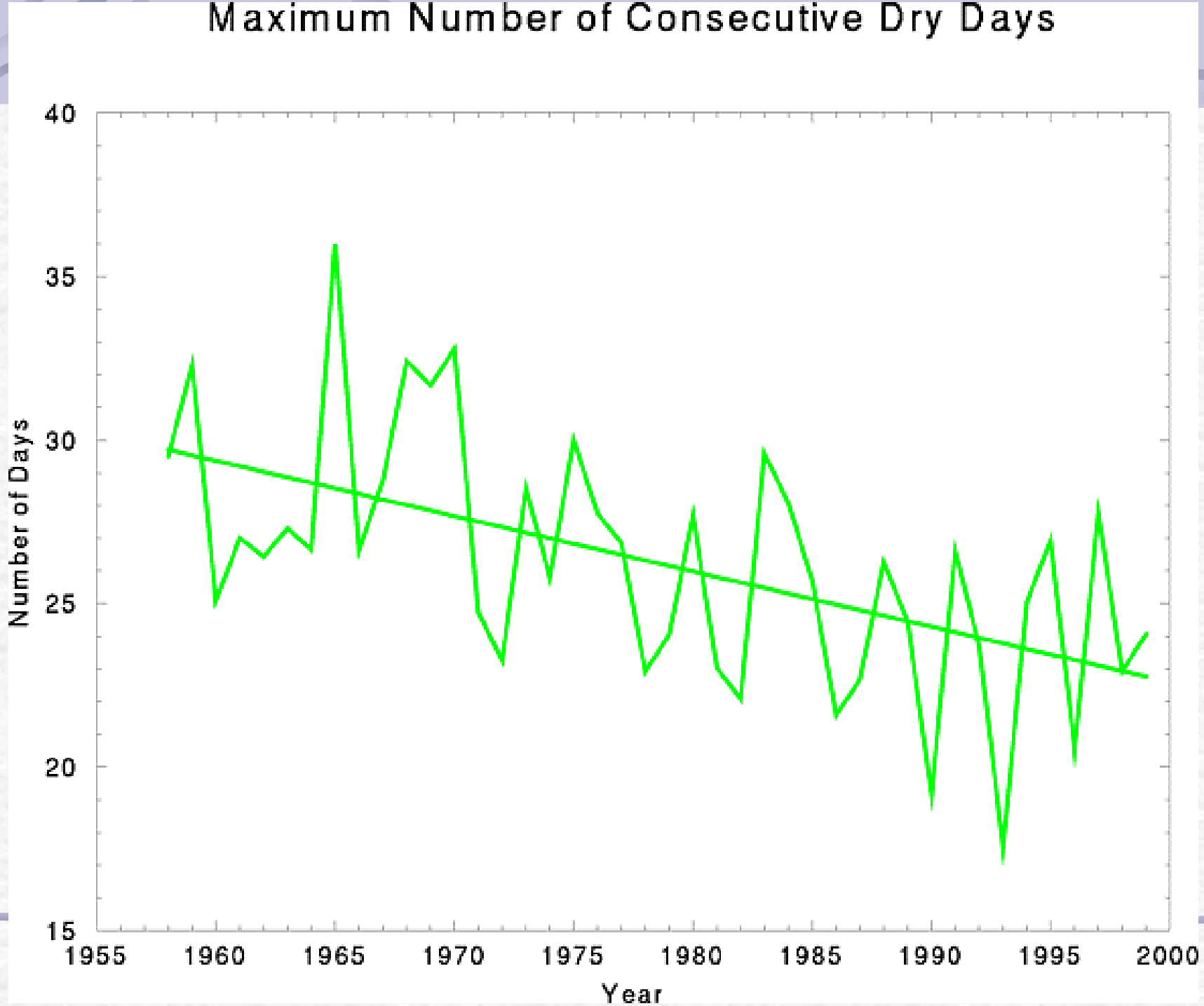

Percent of Days that Tmax < 10th Percentile
Based on Percentiles Calculated during Base Period of 1977-1997
Percent of Days
0
10
20
30
40
50
60
70
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000
Year

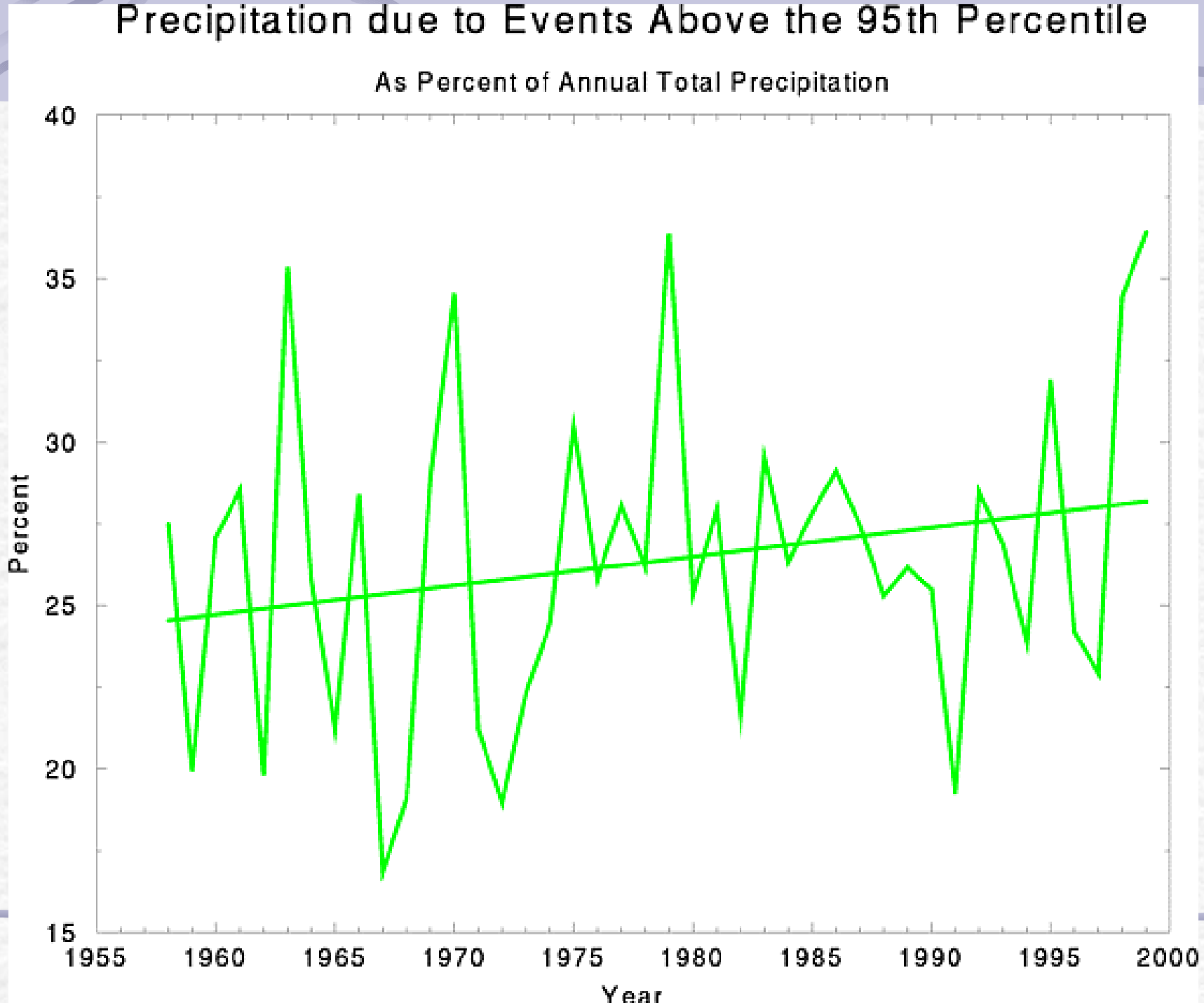

Intra-Annual Extreme Temperature Range
Degrees C
29
27
25
23
21
19
17
15
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000
Year

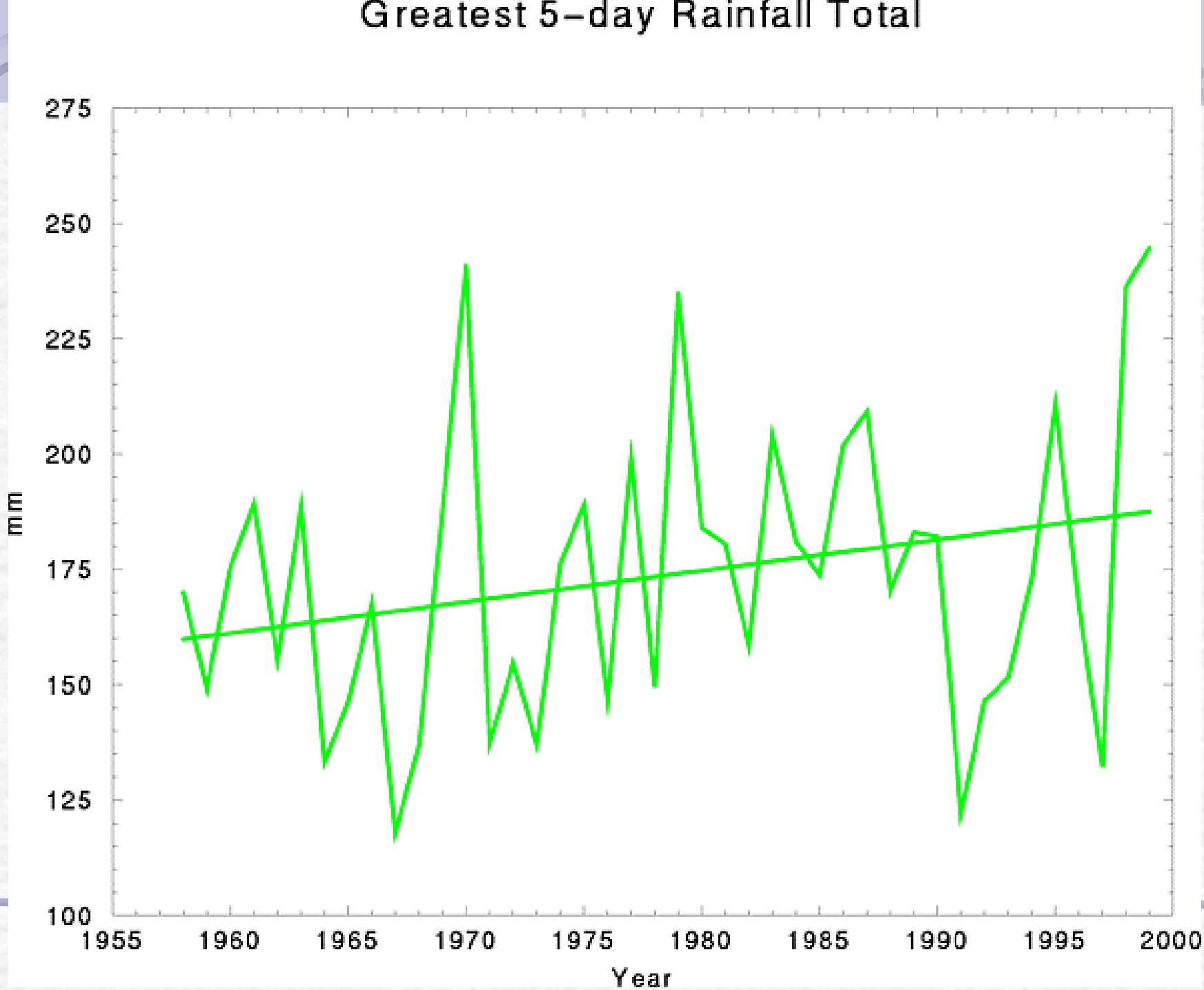

Percent of Days that Temperature > 90th Percentile
Based on Percentiles Calculated during Base Period of 1977-1997
Tmax
Tmin
Percent of Days
Year
0
5
10
15
20
25
30
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000

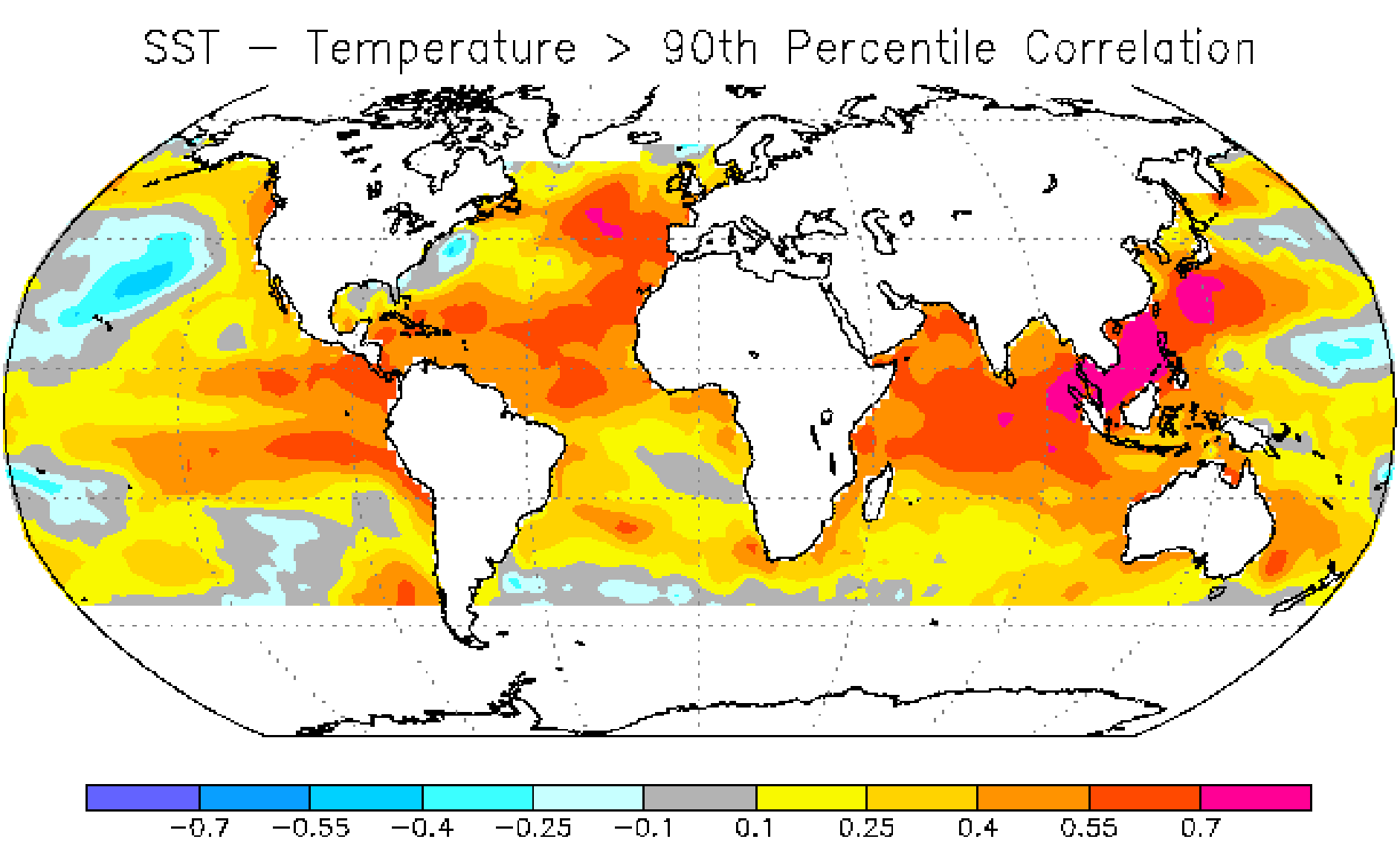

Percent of Days that Temperature < 10th Percentile
Based on Percentiles Calculated during Base Period of 1977-1997
Tmax
Tmin
Percent of Days
Year
0
5
10
15
20
25
30
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000

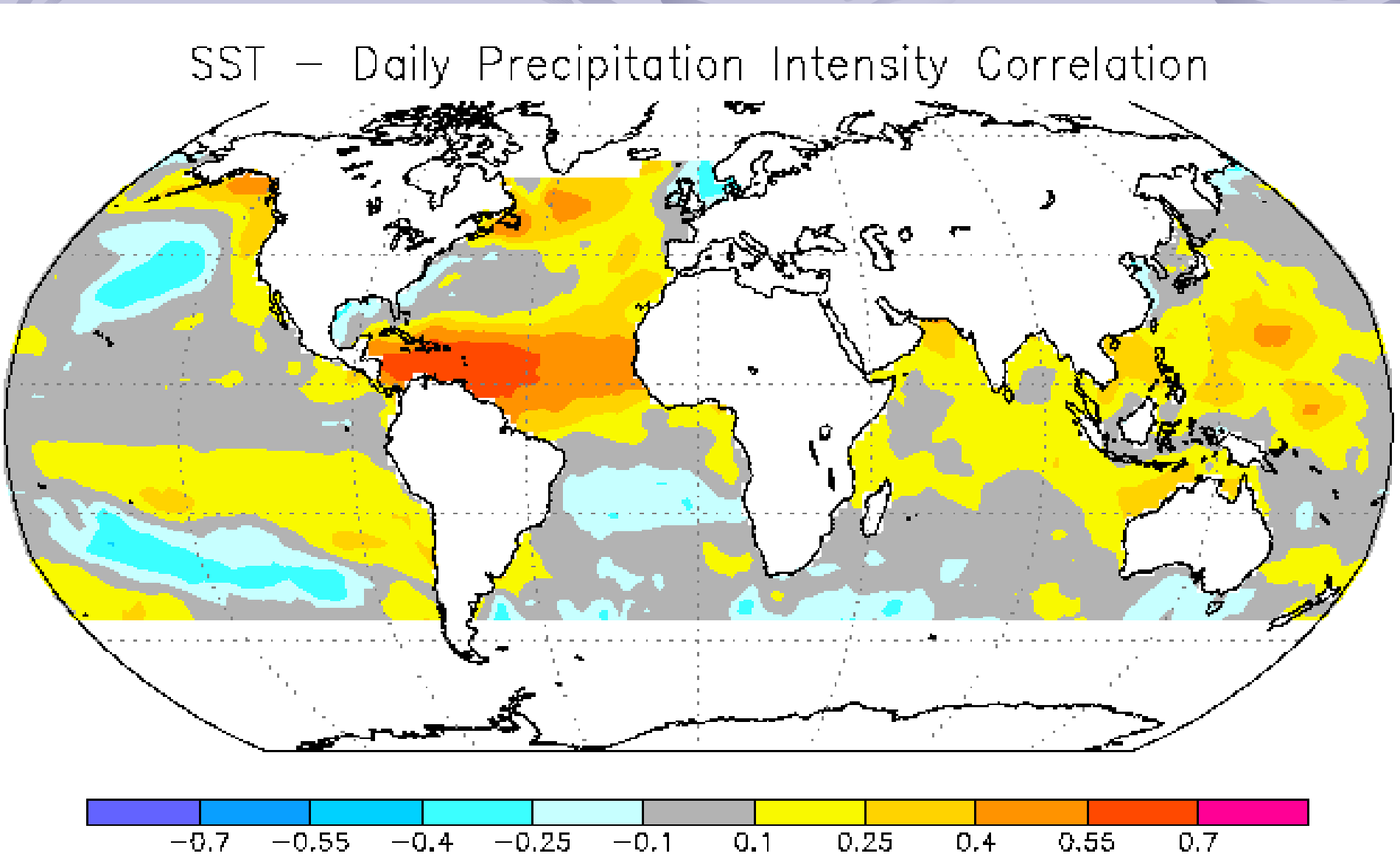

Simple Daily Precipitation Intensity Index
16
15
14
13
12
11
10
9
8
mm/day
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000
Year


Maximum Number of Consecutive Dry Days
40
35
30
25
20
15
Number of Days
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000
Year


Precipitation due to Events Above the 95th Percentile
As Percent of Annual Total Precipitation
Percent
40
35
30
25
20
15
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000
Year


Greatest 5-day Rainfall Total
275
250
225
200
175
150
125
100
mm
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000
Year


SST – Temperature > 90th Percentile Correlation
−0.7
−0.55
−0.4
−0.25
−0.1
0.1
0.25
0.4
0.55
0.7

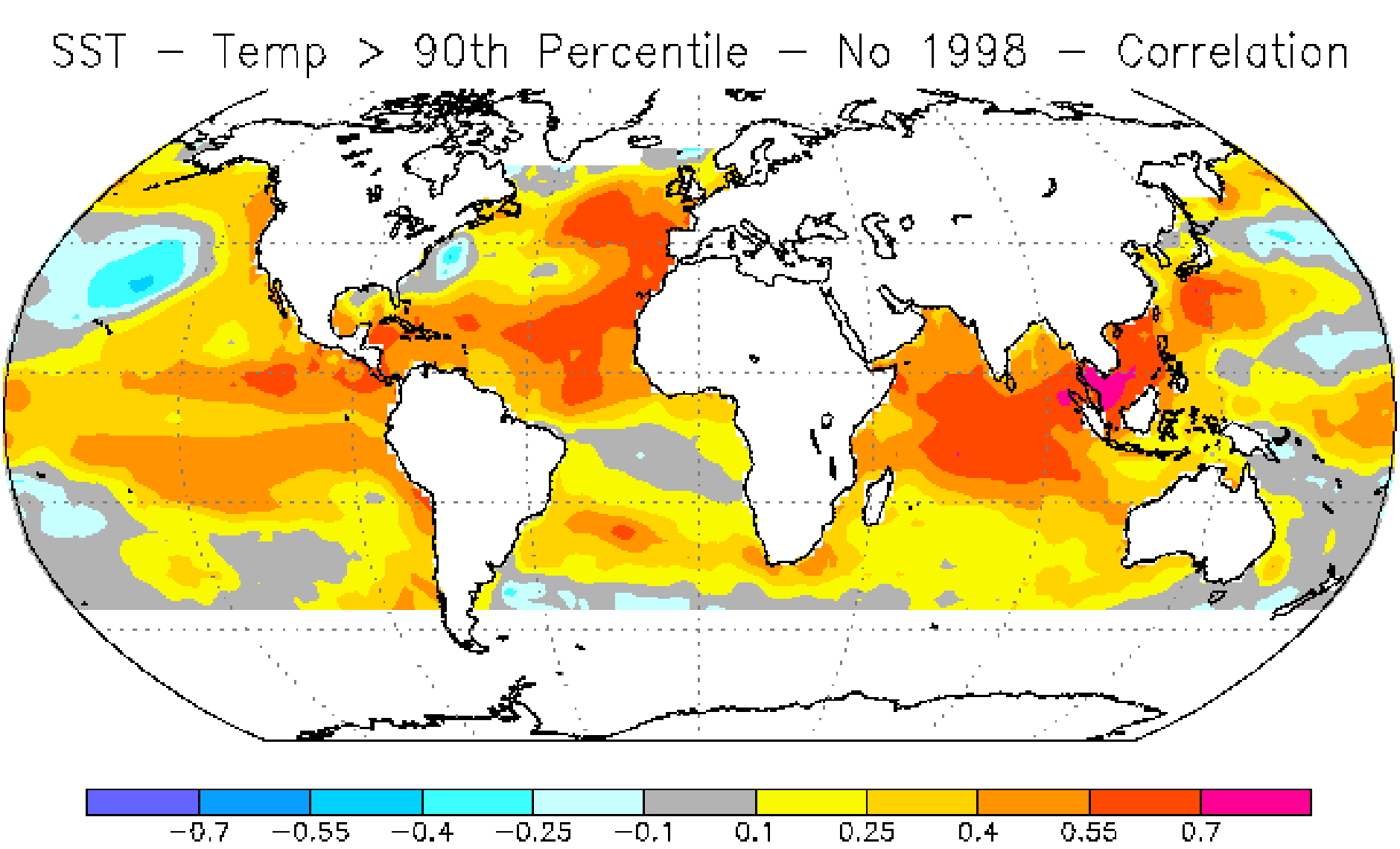

SST – Daily Precipitation Intensity Correlation
−0.7
−0.55
−0.4
−0.25
−0.1
0.1
0.25
0.4
0.55
0.7

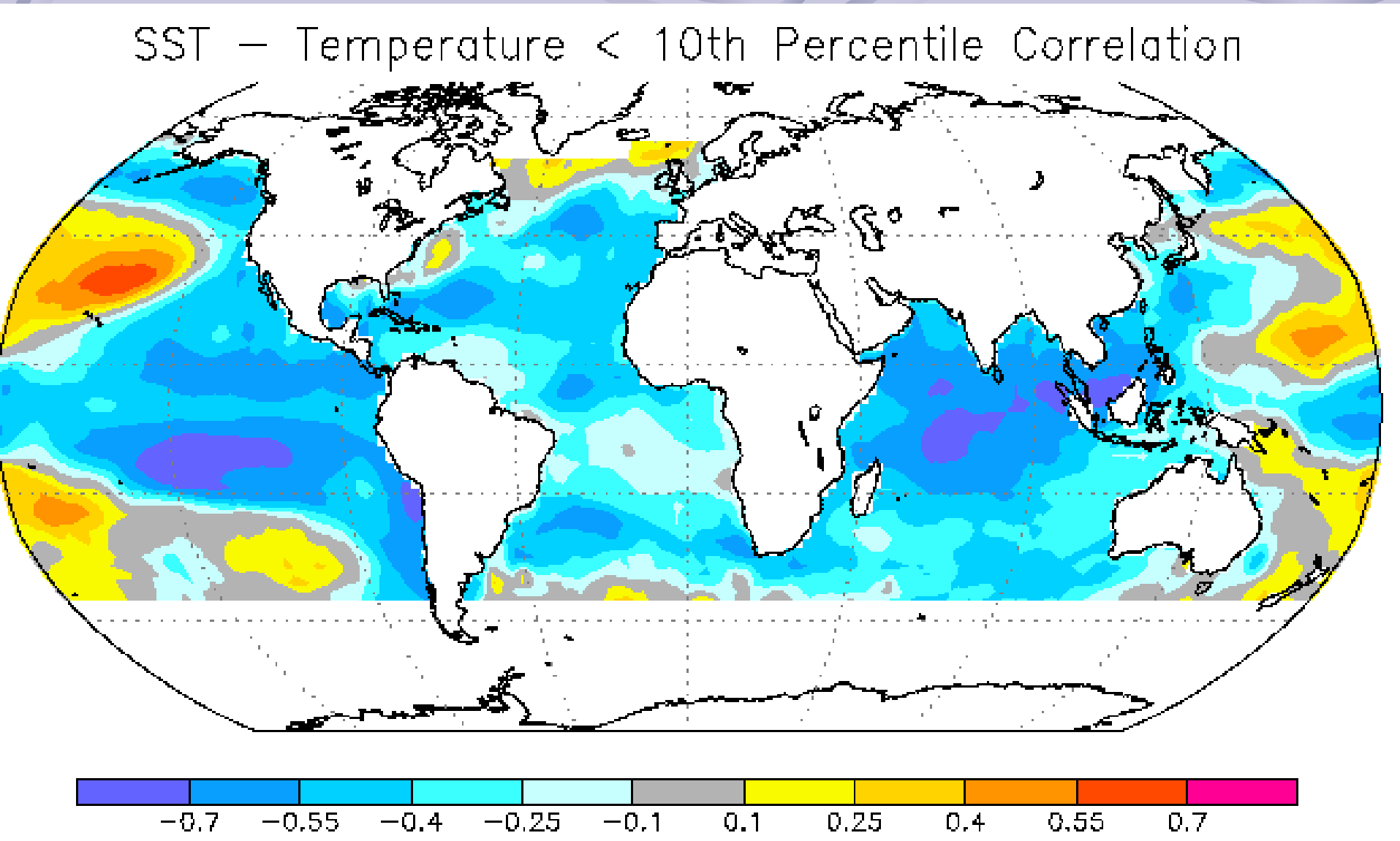
Conclusions

- The extreme intra-annual temperature range is decreasing.
- The number of very warm days and nights is increasing dramatically while the number of very cool days and nights are decreasing.
- Consecutive dry days are decreasing and
- The number of heavy rainfall events is increasing.

Conclusions, continued

- There are relationships to hurricanes and sea surface temperatures, but no one factor dominates all the observed changes.
- Some of the types of changes documented can significantly impact small island countries.
- Continued data archeology and analysis should be encouraged.


SST – Temp > 90th Percentile – No 1998 – Correlation
−0.7
−0.55
−0.4
−0.25
−0.1
0.1
0.25
0.4
0.55
0.7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0.1
0.25
0.4
0.55
0.7